

plastic material and the undersurface of the tray includes three guides, i.e., two side guides 45 and 49 and end guide 47 (guide 47 is located at the end farthest removed from slot 19). The tray 17 includes a window 25 over the place where the data strip 3 will be located when it is scanned; and the window, or its edges if the window is open, serves as additional guide, keeping the data strip in the right plane. The window preferably is the size of the data strip to be read, or just slightly larger. There is also a lower entrance guide 51 at the slot 19, to support the card.

The dimensioning of the tray, guides, and window is such that, when the card is pressed tightly against end guide 47 and side alignment guide 45 and window, three-dimensional alignment is achieved and the card is in the proper position to be scanned.

Drive rollers 27 and 29 are below tray 17 and press upwardly slightly through openings 26 and 28, respectively, in the tray, so they will press the card firmly against the lower surface of the tray. The rollers are normally made of soft, foamed rubber or polyurethane which can frictionally grab and move the inserted card, but which will permit slippage when the card is in place.

The rollers are set at an angle to, rather than parallel to, the longitudinal dimension of the card. Thus, when actuated in the forward direction, the rollers not only pull the card into the reader but also press it against end guide 47 and side alignment guide 49. They also press it against the undersurface of window 25, or, if the window is an opening rather than a sheet of transparent plastic, they press the card against the edges of window 25. Thus, the rollers 27 and 29 serve to force the card 1 into three-dimensional alignment, i.e., against end guide 47, against side alignment guide 49, and against window 25. This alignment is valuable for achieving the most accurate scanning.

Drive rollers 27 and 29 are driven by motor 30 which drives roller 29 and which is connected to roller 27 by belt 50.

Actuation of the rollers and of the scanning cycle is controlled by photodetectors 31 and 33 receiving light for LEDs 32 and 34 (and associated circuitry, not shown, found in printed circuit board 41). Detector 31 is positioned above tray 17 and close enough to slot 19 to initially detect the presence of the leading edge 7 of a card as it is inserted. Upon this initial detection, the rollers 27 and 29 are caused to move in their forward (inward) direction to draw the card into the reader and align it. Detector 33 is positioned to detect the trailing edge of the card when the card has reached its aligned position. This serves to stop the rollers and to start the scanning cycle.

Tray 17 is preferably made of clear plastic. If it is not, however, it is necessary that it have holes in it to permit light from the LEDs to reach the detectors. Use of holes will also serve as a check to be certain that the tray is fully seated within the housing.

The structure and operation of scanner 35 is disclosed in the reader application; and this scanner is presently being sold under the trademark "Softstrip". The scanner has an alignment wheel 38 which fits in longitudinal track 37 and a supporting wheel 40 which rolls along a surface. It also includes a spring-pressed roller 39 pressing against the upper inner surface 51 of the reader housing to hold the scanner down in position. Correction for any possible remaining angular alignment errors

between the scanner and the data strip is accomplished in the manner set forth in the reader application.

Scanner 35 moves from one end of the data strip 3 to the other and, at the same time, scans the data strip transversely along its transverse data lines. Consequently, when the scanner reaches the end of the data strip, all of the dibits of information will have been scanned. Window 25 is in the plane of focus of the scanner; and the scanning is done through this window. To keep the data strip in focus, it is important that the strip be held against the window so that it will be in the plane of focus of the scanning lenses. Rollers 27 and 29 hold it in this place. So that the scanning is directly along the transverse data lines of data on the data strip, it is important that the card bearing the data strip be aligned tightly against side alignment guide 49 and end alignment guide 47.

After the data strip 3 has been scanned, the scanner circuit signals the roller motor to drive rollers 27 and 29 in the reverse direction to eject the card from the reader. This reverse direction has a sidewise component of motion, pressing the card against exit guide 45 which causes it to be directed out the slot 19. This time, when the leading edge 7 of card 1 (now the following edge) passes the first detector 31, the rollers are signalled to stop. The scanner circuit also signals the scanner to return to its home position.

It is possible, by having removable trays, to accommodate different sizes of cards and different placements of the data strips on the cards. For example, one may use a tray such as tray 17a in FIG. 6. This has side alignment guide 49 further removed from window 25a, meaning that the data strip 3 should be on the card at a greater distance 10 than in the former example. The important thing, in any arrangement, however, is for the data strip 3 to be at a predetermined distance from the leading and side edges 7 and 9, that the guides 47 and 49 be located accordingly, and that all serve to locate and hold the data strip in properly aligned position in relationship to the scanner 35.

We claim:

1. A card reader for bi-directional scanning of the data strip on a card while said card is held in a fixed position,

said reader including a housing to receive said card and a bi-directional optical scanner mounted within said housing in a position to scan said card while said card is held stationary in a predetermined position within said housing, said reader including alignment means for positioning said card in said predetermined position within said reader,

said alignment means including a pair of perpendicular alignment guides for receiving adjacent edges of said card and a window for positioning a planar surface of said card, a card driver to move said card to scanning position against said guides and said window and hold said card stationary during scanning, an input detector and an alignment detector, said input detector being located proximate to an input slot in said housing and including circuitry to cause said card driver, upon detection of the presence of a said card, to draw said card into said reader and to position it for scanning, and said alignment detector being adapted to sense when said card is in said predetermined position for scanning and to actuate said optical scanner,